Facility Specific Phosphorus Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Village of Poplar

B. Facility Name: Poplar WWTP

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Phosphorus **Date completed:** July 26, 2019

E. Permit #: WI-0049760-05 **WQSTS #:** (EPA USE ONLY)

F. Duration of Variance five years **Start Date:** Est. January 1, 2020 **End Date:** Est. December 31, 2024

G. Date of Variance Application: March 7, 2019 (complete)

H. Is this permit a:
☒ **First time submittal for variance**
☐ **Renewal of a previous submittal for variance** *(Complete Section X)*

I. Description of proposed variance:
The effluent limit is based on the downstream impacts to Bardon Creek. The WQC for smaller streams like Bardon Creek is 0.075 mg/L and the phosphorus WQBEL calculation formula is cited in NR 217.13 (2)(a), Wis. Adm. Code. Based on NR 102.06 Wis. Adm. Code the effluent limit is 0.225 mg/L as a monthly average and 0.075 mg/L 6-month average. Because the facility is upstream of Lake Superior, an outstanding water resource, a mass limit of 0.036 lbs/day as a 6-month average is also required per NR 217.14(1)(a) Wis. Adm. Code. Given the small nature of this facility, a technology-based phosphorus limitation was not warranted in previous WPDES permits. The Village of Poplar was issued a WPDES permit containing the phosphorus WQBEL on July 1, 2014. During this permit term, Poplar evaluated their compliance options and determined that current options including a facility upgrade and Water Quality Trading are not economically viable.

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Sheri Snowbank	Sheri.Snowbank@wisconsin.gov	715-635-4131	Permit Drafter
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Michael Polkinghorn	michael.polkinghorn@wisconsin.gov	608-266-3906	Limit Calculator

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: 0.075 mg/L Water Quality Criterion

B. List other criteria likely to be affected by variance: N/A

C. Source of Substance: Poplar discharges to an unnamed tributary to Bardon Creek within the Amnicon and Middle Rivers Watershed. According to the Pollutant Load Ratio Estimation Tool (PRESTO) model, 5% of the phosphorus entering the creek is coming from nonpoint sources and natural background conditions. The Village contributes the remaining 95% originating from point sources. (See PRESTO report)

The PRESTO report identifies one other wastewater discharger to Bardon Creek, Maple School District. In 2012 this facility connected their sanitary lines to the municipal WWTF and is no longer permitted.

Citation: PRESTO is a statewide GIS-based tool that compares the average annual phosphorus loads originating from point and nonpoint sources within a watershed. More information about this model is available at http://dnr.wi.gov/topic/surfacewater/presto.html.

D. Ambient Substance Concentration: Zero. ☐ **Measured** ☐ **Estimated** ☒ **Default** ☐ **Unknown**

E. If measured or estimated, what was the basis? Include citation.
Since there is zero background flow, zero is assumed to be the background concentration at the point of discharge.

Citation: June 19, 2019 Water Quality-Based Effluent Limitations memo

Average effluent discharge rate: 0.05 MGD (average flow from 1/1/2014 – 12/31/2018)
0.057 MGD Average design flow

Maximum effluent discharge rate: 0.24 MGD (April 13, 2014)

F. Effluent Substance Concentration:
1-day 99th percentile value = 6.85 mg/L
4-day 99th percentile value = 5.36 mg/L
30-day 99th percentile value = 4.54 mg/L
Mean = 4.12 mg/L
(January 1, 2014 – December 31, 2018)

☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

G. If measured or estimated, what was the basis? Include Citation. Effluent data reported during the current permit term.

Citation: Submitted electronic Discharge Monitoring Forms

H. Highest Attainable Condition (HAC) Type:
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☒ **Type 3: HAC reflects current effluent conditions**

Statement of HAC: The Department has determined the highest attainable condition is achieved through the application of the variance limit in the permit, combined with a permit requirement to pursue phosphorus optimization. Thus, the HAC during the permit term is 7.0 mg/L, which reflects the greatest phosphorus reduction achievable in conjunction with the implementation of the permittee's PMP. This HAC determination is based on the economic feasibility of available compliance options for Poplar at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

I. Variance Limit: 7.0 mg/L as a monthly average.

J. Level currently achievable (LCA): 7.0 mg/L as a monthly average

K. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)* Based upon 57 effluent data points from January 2018 – January 2019. The interim monthly average phosphorus limit of 6.85 mg/L (rounded to 7.0 mg/L) is consistent with the 1-day p99 value.

L. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation. The variance limit is set at 7.0 mg/L. The permittee is actively improving sources of Infiltration/Inflow (I/I). The reduced flows have led and may lead to further increases in the concentration of effluent phosphorus. The variance limit is set at the concentration the permittee can meet without investing in additional treatment while allowing for operational flexibility. This is consistent with the limits expressed in s. NR 217.17, Wis. Adm. Code and additionally, this averaging period is consistent with the limit expression in accordance with s. NR 217.14(2), Wis. Adm. Code.

Citation: June 19, 2019 Water Quality-Based Effluent Limitations memo

M. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below:
☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☒ **6**

The Village of Poplar is currently required to monitor phosphorus but was not designed for chemical removal of phosphorus through chemical feed. During the current permit term, Poplar evaluated their compliance options and determined that all available options were not economically feasible. Improving the facility and optimizing phosphorus treatment during the upcoming permit term are actions that are expected to lead to reduced phosphorus levels over the course of the variance. Given the long-term effects of phosphorus pollution, an interim monthly

average limit of 7.0 mg/L is recommended along with implementation of the Phosphorus PMP.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Douglas County

B. Receiving waterbody at discharge point: Unnamed Tributary to Bardon Creek within the Amnicon and Middle Rivers Watershed in the Lake Superior Drainage Basin in Douglas County

C. Flows into which stream/river? Bardon Creek **How many miles downstream?** About 0.6 miles

D. Coordinates of discharge point (UTM or Lat/Long): X= 385339.56, Y= 681221.75

E. What are the designated uses associated with this waterbody?
The creek is designated as a Limited Aquatic Life (LAL), Non-public Water Supply and within the Ceded Territory (Wild rice has not been recorded).

F. Describe downstream waters:
The unnamed tributary discharges to Bardon Creek. Bardon Creek is classified as Limited Forage Fish (LFF) for its entire length (approximately 12.4 miles) ending in Lake Superior. Lake Superior is classified as an Outstanding Resource Water.

G. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the applicable criterion of the substance?
It is unknown. Currently, there is no known supporting data for the 12.4 downstream miles.

H. Provide the equation used to calculate that distance.
N/A – No specific equation used.

I. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody:
There are no other permittees that discharge to Bardon Creek that have a phosphorus variance.

(See the map "Variance Locations – Village of Poplar" for more information.)

Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet.

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☐ **Yes** ☒ **No** ☐ **Unknown**

River Mile	Pollutant	Impairment

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing phosphorus to the POTW? If so, please list.
The Village of Poplar is too small to have local pretreatment authority (Design flow < 5 MGD). All users in the Village are billed a flat rate per Residential Equivalency Unit (REU). There are no significant commercial, institutional or industrial sources.

B. Are all industrial users in compliance with local pretreatment limits for phosphorus? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)
N/A

C. When were local pretreatment limits for phosphorus last calculated?

N/A

D. Please provide information on specific PMP activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
N/A

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☒ **Yes** ☐ **No**

B. If yes, was a public hearing held as well? ☒ **Yes** ☐ **No** ☐ **N/A**

C. What type of notice was given?
☒ **Notice of variance included in notice for permit** ☐ **Separate notice of variance**

D. Date of public notice: _____ **Date of hearing:** _____

E. Were comments received from the public in regards to this notice or hearing? *(If yes, please attach on a separate sheet)* ☐ **Yes** ☒ **No**

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ **Yes** ☒ **No**

B. Applicable criteria affected by variance: N/A

C. **Identify any expected impacts that the variance may have upon human health, and include any citations:**
None

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Limited Aquatic Life (LAL) (per NR 104.10 Wis. Adm. Code)

B. Applicable criteria affected by variance: 0.075 mg/L, Fish and Aquatic Life Criteria (applicable to protect downstream waters)

Citation: June 19, 2019 Water Quality-Based Effluent Limitations memo

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
Directly downstream of the outfall the unnamed tributary is classified as a Limited Aquatic Life (LAL) system. The tributary joins Bardon Creek in approximately 0.6 miles. Bardon Creek is approximately 12 miles long and is classified as a Limited Forage Fish.

Agricultural, residential and urban nonpoint source pollution and background sources (forests and wetlands) have impacted the habitat in Bardon Creek. PRESTO has corroborated these nonpoint source inputs to Bardon Creek, estimated that approximately 95% of the phosphorus loading is coming from nonpoint sources.

Installation of traditional phosphorus treatment and on-site optimization measures will help ensure that further degradation of the environment will not occur with this variance. Continued phosphorus reduction measures will be implemented to improve water quality and minimize environmental impacts. (See PRESTO report)

PRESTO - http://dnr.wi.gov/topic/surfacewater/presto.html.

Surface Water Condition Viewer - https://dnr.wi.gov/water/watershedDetail.aspx?key=924669

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations:
The following list contains the Federal and State Endangered, Threatened, Proposed, and Candidate Species in Douglas County, Wisconsin:

MAMMALS
Gray wolf (*Canis lupus*) (E-Fed)
Northern Long-Eared Bat (*Myotis septentrionalis*) (T-Fed)
Canada Lynx ((*Lynx canadensis*) (T-Fed)

BIRDS

Kirtland's Warbler (*Setophaga kirtlandii (= Dendroica kirtlandii)*) (E-Fed)
Piping Plover (*Charadrius melodus*) (E-Fed)
Red knot (*Calidris canutus rufa*) (T-Fed)

PLANTS
Fassett's locoweed (*Oxytropis campestris var. chartacea*) (T-Fed)

Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technologies (treatment processes):

The Village of Poplar wastewater treatment facility serves a population of approximately 620 with 367 residential users and no significant industrial contributors. The annual average design flow is 57,000 gallons per day with actual flows averaging 50,000 gallons per day over the past five years (2014 – 2018 data). Treatment consists of an inclined screen followed by two covered aerated lagoons divided in half by floating baffles creating cells 1-4. This is followed by a third covered lagoon that is partially-aerated (cell 5) then to a covered un-aerated settling lagoon (cell 6). The effluent from the settling lagoon is routed through a polishing reactor for effluent aeration which reduces BOD and ammonia levels. The effluent from the polishing reactor flows by gravity through an effluent sampling manhole and then to the outfall (an unnamed tributary to Bardon Creek).

B. **What modifications would be necessary to comply with the current limits? List additional treatment processes and/or technologies available. Include any citations.**

At the time of this document the Poplar WWTF does not treat for phosphorus removal. A major upgrade would be necessary to meet the final WQBEL of 0.225 mg/L as a monthly average and 0.075 mg/L 6-month average.

1. Upgrade the WWTF to meet the WQBEL for phosphorus with the installation of chemical phosphorus removal and Tertiary Phosphorus Removal (for example disc filtration, ultrafiltration, ballasted clarification, and upflow reactive sand filtration processes).
   a. Repair 2018 storm damage as necessary to complement the needed upgrades
   b. Upgrade the collection system, requiring televising and spot repairs
   c. Chemical phosphorus removal would require chemical storage/spill containment, chemical feed including pumps and control, new piping and electrical wiring
   d. Tertiary phosphorus removal would need great deal of new infrastructure, a new building, specific technologies such as tanks, mixers, filters, etc., instrumentations and controls, electrical wiring and plumbing/piping.
2. Water Quality Trading to meet WQBEL for phosphorus alone or with chemical phosphorus removal would require upgrades related to repairing storm damage and the collection system, chemical phosphorus removal as well as development of a nutrient management plan, investigation and recruitment of trading partners, payments for implementation of BMPs, installation of waste storage facilities, and technical support.

Citation: "Final Compliance Alternatives Plan for Phosphorus WQBEL Compliance" dated June 2018

C. Identify any expected environmental impacts that would result from further treatment, and include any citations: N/A

D. Is it technically and economically feasible for this permittee to modify the treatment process to comply with the water quality-based limits? ☐ **Yes** ☒ **No**

E. If treatment is possible, is it possible to comply with the limits on the substance? ☒ **Yes** ☐ **No**

F. If yes, what prevents this from being done? Include any citations.

All evaluated compliance options are economically infeasible at this time because the cost would result in a user rate in excess of 2%.

Citation: "Final Compliance Alternatives Plan for Phosphorus WQBEL Compliance" dated June 2018

G. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

Chemical phosphorus, tertiary phosphorus removal and water quality trading were all considered and rejected because they are not financially feasible at this time.

Chemical addition for phosphorus removal cannot alone meet the final WQBEL of 0.225 mg/L as a monthly average and 0.075 mg/L 6-month average additional treatment would be required. In the future chemical addition may be a logical first step for multiple options.

Treatment to meet the final WQBEL would need tertiary phosphorus removal. There are many methods of tertiary removal including disc filtration, ultrafiltration, ballasted clarification, and upflow reactive sand filtration processes. Disc filtration was chosen for investigation due to positive field trials and costs. At this time financing such a project would cause widespread adverse social and economic impacts to the Village.

Water quality trading either alone or in conjunction with chemical phosphorus removal was determined to be infeasible due to the lack of phosphorus reductions in the watershed. The permittee will continue to investigate, with the assistance of Douglas County Land and Water Conservation Department, to identify and install nonpoint source practices.

Citation: "Final Compliance Alternatives Plan for Phosphorus WQBEL Compliance" dated June 2018

H. **Describe the economic impacts of compliance:** ***{applies only to municipalities; include other cost estimates for industries}***

The Village of Poplar is a small, rural community composed primarily of residential development with no major industries. The population of Poplar is 620 with 367 residential users. The economic impact of compliance would result in a residential user rate charge which would exceed 2% of the MHI (Calculated Primary Screener).

At the time of the Final Compliance Alternatives Plan the user rate was 1.27% of MHI. Rural Community Assistance Program (RCAP) of the USDA Rural Development evaluated the existing Village and sewer utility finances. RCAP reviewed all debt service, current O&M costs, and projected O&M costs (not including any upgrades to the facility) and established that the sewer rates should be $98.16 per month ($1,178/year) which is a rate increase of $38.16. This rate is equivalent to 2.08% of the MHI. Since the submittal of the Final Compliance Alternatives Plan the Village has implemented the recommendation and the rate increase has been implemented. The Village is unable to absorb the additional financial burden of an upgrade; user fees would need to substantially increase, resulting in a negative social impact; a weakened and non-vital local economy; and reduced tax base.

In supporting the preliminary economic screener, the secondary indicator score for the community is 2.

Economic Factor		Source
MHI	$56,750	Phosphorus Variance Application for Municipal Facilities (Form 3200-143)
Calculated preliminary screener	2.08%	"Final Compliance Alternatives Plan for Phosphorus WQBEL Compliance"
Secondary score value	6	Guidance for Implementing Wisconsin's Multi-Discharger Variance for Phosphorus, Appendix A – Secondary Screeners for Municipal POTWs

Section IX: Multi-Discharger Variance Feasibility *(this assumes MDV approval)*

A. Does the facility meet the economic indicators to qualify for the MDV? ☒ Yes ☐ No ☐ Unknown

MDV secondary indicator score: 6

B. Is it technically and economically feasible for this permittee to comply with a phosphorus WQBEL of 1 mg/L or lower? ☐ Yes ☒ No ☐ Unknown

Justification for considering an individual variance in lieu of the MDV: The cost of a plant upgrade to meet 1mg/L would increase the residential user rates to >2% of the MHI.

Section X: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

- The permittee completed a chemical phosphorus removal pilot test.
- Identification and investigation of feasibility of potential Water Quality Trading partners.
- Continued implementation of the Capacity Management Operation Maintenance (CMOM) program which prioritizes Infiltration and Inflow (I/I) reductions.
- Contacts with the Maple School District and residents to reduce the use of phosphorus-based cleaners.

Citation: "Final Compliance Alternatives Plan for Phosphorus WQBEL Compliance" dated June 2018 and "Phosphorus Pollutant Minimization Plan" revised September 2018

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

During this permit term, the Village of Poplar WWTF responsibilities include:

- Continue to reduce I/I to sanitary collection system through CMOM initiatives
- Reduce effluent phosphorus concentrations and loadings by repairs to the treatment infrastructure including sludge removal, lagoon cover replacement, and repairs of storm damaged lagoon covers and berms
- Continue to evaluate potential watershed reduction projects with Douglas County Land Conservation Department and partners for phosphorus water quality trading.

Citation: "Phosphorus Pollutant Minimization Plan", revised September 2018 and "Final Compliance Alternatives Plan for Phosphorus WQBEL Compliance" dated June 2018

This permit contains a variance to the water quality based effluent limit (WQBEL) for phosphorus granted in accordance with s. 283.15, Wis. Stats. As conditions of this variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitations specified in the permit, (b) implement the phosphorus pollutant minimization measures specified in the Pollutant Minimization Plan (PMP) date October 2018 and (c) perform the actions listed in the schedule section of the permit.

12/31/2020 – Annual Phosphorus Progress Report

12/31/2021 – Annual Phosphorus Progress Report #2

12/31/2022 – Annual Phosphorus Progress Report #3

12/31/2023 – Annual Phosphorus Progress Report #4

12/31/2024 – Final Phosphorus Report

December 31st in future years – Annual Phosphorus Progress Report After Permit Expiration

Section XI: Compliance with Previous Permit *(Variance Reissuances Only)*

A.	**Date of previous submittal:** Not Applicable	**Date of EPA Approval:**	
B.	**Previous Permit #:**	**Previous WQSTS #:**	(EPA USE ONLY)
C.	**Effluent substance concentration:**	**Variance Limit:**	
D.	**Target Value(s):**	**Achieved?**	☐ **Yes** ☐ **No** ☐ **Partial**

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	**Compliance**
N/A	☐ **Yes** ☐ **No**